

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE  
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

1. A method for basis conversion between a pair of correspondents, said method comprising the steps of :
  - transmitting an element represented in a first basis from a first correspondent to an intermediate processor;
  - converting the transmitted element into a second basis representation by said intermediate processor to produce a converted element;
  - forwarding said converted element to the first correspondent; and
  - operating on said converted element by said first correspondent in a cryptographic operation.
2. A method according to claim 1 further comprising the step of: transmitting a result of said cryptographic operation to said second correspondent.
3. A method according to claim 2, wherein said result is a signature.
4. A method according to claim 2 further comprising the step of transmitting said converted element by said intermediate processor to said second correspondent.
5. A method according to claim 2 further comprising the step of transmitting said converted element by said first correspondent to said second correspondent.
6. A method according to claims 4 and 5, wherein said converted element is a short term public key.
7. A method according to claims 4 and 5, wherein said converted element is a long term public key.
8. A method according to claim 1, wherein one of said correspondents is a low power computing device.

9. A method according to claim 8, wherein said low power computing device is a smartcard.
10. A method according to claim 1, wherein said cryptographic operation employs an elliptic curved scheme.
11. A method according to claim 1, wherein said intermediate processor is a Certifying Authority.
12. A method for information exchange between a pair of correspondents operating in different basis, the method comprising the steps of:
- transmitting an element represented in a first basis from a first correspondent to an intermediate processor;
  - transmitting of a second element represented in a second basis from a second correspondent to said intermediate processor;
  - converting the transmitted first element into said second basis representation by said intermediate processor to produce a first converted element; converting the transmitted second element into a first basis representation by said intermediate processor to produce a second converted element;
  - forwarding said first converted element to said second correspondent; and
  - forwarding said second converted element to said first correspondent.
13. A method according to claim 12 further comprising the step of operating on said second converted element by said first correspondent in a cryptographic operation to produce a result.
14. A method according to claim 13 further comprising the step of operating on said first converted element by said second correspondent in said cryptographic operation to produce a second result.
15. A method according to claims 13 and 14, wherein said converted elements are public keys.

16. A method according to claim 15, wherein said result is a common key shared between said correspondents.
17. A method according to claim 16 further comprising the step of employing said common key in subsequent steps of a cryptographic scheme.
18. A method according to claim 17, wherein said cryptographic scheme is an elliptic curve scheme.
19. In a cryptographic system, a method for generating a basis independent bit string, the method comprising the steps of:
- representing a first field element in terms of a first basis;
  - computing a first function of a first sequence of traces of said first field element;
  - and using said first sequence of traces as said bit string.
20. A method according to claim 19 further comprising the steps of:
- representing a second field element in terms of a second basis;
  - computing a second function of a second sequence of traces of said second field element; and using said second sequence of traces as said bit string.
21. A method according to claim 20, wherein said first function is equal to said second function.
22. A method according to claim 20, wherein an order of said sequence of traces is shared between a first correspondent and a second correspondent.
23. A method according to claim 20 further including the step of using said bit string as a shared secret in a cryptographic scheme between a first correspondent and a second correspondent.
24. A method according to claim 23, wherein said cryptographic scheme is an elliptic curved scheme.

25. A method according to claim 19, wherein said first function is an irreducible polynomial of degree  $N$ .
26. A method according to claim 20, wherein said second function is an irreducible polynomial of degree  $N$ .
27. A method according to claims 24 and 25, wherein said first field element is converted in terms of said second basis by finding a root for said polynomial for said first basis in a representation generated by said second basis; and evaluating said polynomial representing said first field element in said first basis at said root.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.